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Mosquitoes of the Cheyenne Bottoms Waterfowl Management Area, Barton County, Kansas

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MOSQUITOES OF THE CHEYENNE BOTTOMS WATERFOWL MANAGEMENT AREA, BARTON COUNTY, KANSAS[1]

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ABSTRACT

Studies of the local biology of eleven species of mosquitoes in a prairie marsh in central Kansas revealed that "floodwater" species (*Aedes dorsalis, A. nigromaculis, A. sollicitans, A. vexans, Psorophora ciliata, P. cyanescens*) formed a major portion of the total mosquito population and were the principal pests after early June. *Culex tarsalis* was the most numerous single species and was captured in large numbers even during the hot, dry period from mid-July to late August. *Culiseta inornata* was plentiful in early spring and fall, but virtually absent from late May to mid-September. *Culex pipiens, Orthopodomyia signifera,* and *Anopheles punctipennis* were captured only a few times or in very small numbers.

Fields bordering the marsh and flooded following heavy late spring rains were the principal production sites for "floodwater" species. *Aedes dorsalis, A. nigromaculis, A. sollicitans, A. vexans, P. ciliata,* and *C. tarsalis* were all observed to bite man under various field conditions. *C. tarsalis, A. nigromaculis,* and *A. sollicitans* were the only species captured in traps baited with small birds and placed in areas where all "floodwater" species were most abundant. Although all species captured have been collected in the state before, this study was the first of its type in central Kansas.

Preliminary studies of the epidemiology of avian malaria and encephalitis viruses in the Cheyenne Bottoms Waterfowl Management Area, Barton County, Kansas, revealed that virtually nothing was known of the biology of local mosquitoes. A two-year study of potential vectors was begun in the spring of 1963 and subsequent research revealed the general patterns of local mosquito biology.

THE STUDY AREA

The Cheyenne Bottoms is a prairie marsh located near Great Bend, Barton County, Kansas. It is a sink hole, covering almost 30 square miles, in which the water level is maintained at two to three feet deep by a system of dikes, gates, and canals. Cattails, sawgrass, sedges, and planted millet are the principal marsh grasses and a dense cattail growth covers much of the permanent water area. The outlying edges of the

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marsh end indefinitely in pastures and cultivated fields and extensive shallow flooding of these areas occurs following heavy rains.

Rainfall is usually heaviest during late spring and early fall. Spring is characterized by almost continuous strong southerly winds, blowing dust, and violent thunderstorms. Summer is dry, particularly July and August, with daytime temperatures of over 100°F.

The wildlife management, public hunting, and refuge activities of the area are under the control of the Kansas Forestry, Fish, and Game Commission.

METHODS

Mosquito collections were made from March through October of each year. Regular collections were made in many parts of the marsh throughout this time. Adults were captured by use of New Jersey light traps, both battery and 110V-operated, dry ice and baited traps, sweep nets, and aspirators. Dry ice and bait traps were made from five-gallon alcohol cans. Both ends of these cans were removed, an inward-pointing screen cone was placed in one end and a cloth sleeve was placed over the other. At the time of identification, males were placed in 70 per cent ethanol. Male terminalia were later bleached and mounted for identification. Mosquitoes were identified with the keys of Carpenter and LaCasse (1955).

RESULTS

Eleven species of mosquitoes were captured over the two-year period. Adult collection results are summarized in Table I. No mosquitoes were captured in March or November of either year.

A brief account of the biology of the eleven species is given below:

Anopheles punctipennis (Say), 1823: Larvae and adults collected in small numbers, only in September. Larvae occurred in roadside ditches in section 27, T18S, R13W, and in a shaded drainage ditch on the Rusco farm in section 2, T19S, R13W.

Culiseta inornata (Williston) 1893: Egg rafts and larvae collected as early as April 14 and adults as late as October 25. Adults and larvae exceedingly rare between June 1 and October 1, but relatively abundant during April and October. Larvae collected at several locations (ditches in section 27, T18S, R13W; section 11, T18S, R12W; and section 2, T19S, R13W) but the sheltered drainage ditch on the Rusco farm in section 2, T19S, R13W, appeared to be a major breeding place. This species probably winters locally as an adult because all the locations in which larvae were collected were dry throughout the winter.

Orthopodomyia signifera (Coquillett) 1896: A single specimen collected October 17, 1963, near a wooded stream in section 4, T19S, R13W.

Psorophora ciliata (Fabricius) 1794: Adults collected and observed in

TABLE 1. Adult mosquitoes captured at Cheyenne Bottoms, Barton County, Kansas, March–October, 1963–1964.

Species	Number captured	Times captured
Culex tarsalis	5461	59
Aedes dorsalis	3579	38
Aedes nigromaculis	1731	35
Aedes vexans	1225	34
Aedes sollicitans	1382	30
Culiseta inornata	560	21
Culex pipiens	260	24
Anopheles punctipennis	42	3
Psorophora ciliata	28	9
Psorophora cyanescens	7	4
Orthopodomyia signifera	1	1

mid-June in several areas encompassing the entire marsh following heavy rains. A single pupa collected September 2, 1964, in a shaded drainage ditch on the Rusco farm, and larvae collected in late September in ditches bordering the marsh.

Psorophora cyanescens (Coquillett) 1902: A few adults collected in mid- June, following heavy rains, in section 34, T18S, R13W.

Aedes dorsalis (Meigen) 1830: Larvae collected as early as April 14, adults as late as October 25. This species was one of the most abundant throughout the mosquito season. Local breeding places included most of the ditches along roads leading into the marsh. Locally, eggs of this species apparently hatch quickly after being immersed any time during the mosquito season since larvae were collected in temporary pools during late summer when this was not posssible for other "floodwater" *Aedes*.

Aedes nigromaculis (Ludlow) 1907: Adults collected from May 19 to October 25. Principal breeding areas were the flooded fields bordering the marsh and adults were most numerous in these areas. Adults reached a peak abundance in early summer and decreased steadily in number until October. This species viciously attacked persons entering the areas bordering the marsh and was captured in traps baited with small birds.

Aedes sollicitans (Walker) 1856: Adults collected as early as May 19 and as late as October 25. The local biology of this species paralleled closely that of *A. nigromaculis* although it was not as numerous as the latter. *A. sollicitans* was also captured in traps baited with small birds.

Aedes vexans (Meigen) 1830: Adults collected from May 4 (single specimen) to October 25. No larvae of this species were collected over the entire two-year period. *A. vexans* was most abundant in the areas bordering the marsh and readily attacked man but was not captured in traps baited with small birds.

Culex pipiens Linnaeus 1758: Adults collected in small numbers from May 19 to October 17. Principal collection sites were the southern parts

of section 27, T18S, R13W and section 4, T19S, R13W. Larvae collected in these same areas in June only.

Culex tarsalis Coquillett 1896: Adults and larvae collected as early as May 7, larvae taken in large numbers in September, and adults as late as October 25. Adults were captured during July and August but all locations in which larvae were collected were dry throughout this time. Principal breeding places were the roadside ditches, but adults could be captured at most locations within the Cheyenne Bottoms. Adults readily taken in traps baited with small birds.

I was unable to collect mosquito larvae in the permanent waters of the marsh over the entire two-year period. Evidently the permanent water does not contribute significantly to the production of the total mosquito population. The grassy areas along the dikes, however, abound with adults, particularly *Aedes nigromaculis* and *A. sollicitans.*

Local feeding habits of the various species were not studied in detail. However, *Aedes dorsalis, A. nigromaculis, A. sollicitans, A. vexans, Psorophora ciliata,* and *Culex tarsalis* were all observed to bite or attempt to bite man under various field conditions. Traps in pastures bordering the marsh, baited with Starlings, captured only *Culex tarsalis, Aedes nigromaculis,* and *A. sollicitans.* These traps did not capture large numbers of individuals (115 mosquitoes in 12 trap-nights), but the proportions of the three species and the number engorged indicated that all three will readily feed on small birds near the ground.

DISCUSSION

Over the entire two-year period, only eleven species of mosquitoes were collected within the Cheyenne Bottoms. Perhaps the ecological uniformity of the area is responsible for this small number. Of the eleven, six are stated as being floodwater species or species breeding in intermittent pools (Carpenter and LaCasse, 1955; Horsfall, 1955); and, of the remaining five, only two (*Culex tarsalis* and *Culiseta inornata*) were collected in sizable numbers. *Culex tarsalis* is evidently the most abundant species and is captured continuously throughout the mosquito season and in all parts of the area. *Culiseta inornata* is quite seasonal, being almost entirely a spring and fall mosquito locally.

All species have been collected previously in Kansas (Carpenter and LaCasse, 1955; Hill, 1939); however, apparently little information is available concerning the distribution of these species within the state.

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